

Constructed Response**Mechanisms for Evolution**

1. Researchers studying Afrikaners, a group of South African humans descended from Dutch colonists, found them to have less genetic variation than the original Dutch population. Around the mid-1600s, the Afrikaners migrated from Europe to Africa. This migration separated the Afrikaners from their original population by thousands of miles.

- Identify and describe the process of gene flow caused by the separation of the Afrikaners from the original Dutch population.
- Analyze the effects of other evolutionary mechanisms, including genetic drift and gene flow on two such populations that are somewhat geographically separated.
- Identify the type of evolution, either microevolution or macroevolution, that the genetic variation in Afrikaners represents.
- If the populations were kept separate for many thousands of years, what kind of speciation would be likely to occur?

2. Charles Darwin is nicknamed the “Father of Evolution” for the role he played in developing the theory of evolution. Darwin proposed the idea of natural selection.

- Explain the concept of natural selection.
- Compare natural selection with artificial selection.
- Identify, analyze, and evaluate three examples of evidence that support Darwin's idea of natural selection and the evolutionary theory as a scientific explanation for the unity and diversity of life.

3. A group of moths have either yellow wing color (Y) or white wing color (y). Sixty percent of the moths have the Y allele for yellow wing color. Use this data and your knowledge of the Hardy-Weinberg principle to:

- Describe the Hardy-Weinberg equilibrium principle.
- Explain why the principle is not realistic in nature.
- Calculate the frequencies of the three possible genotypes for wing color.

4. Depending on environmental conditions, nature can select for a variety of different traits that make living things best adapted for survival and reproduction.

- Describe, analyze, and evaluate a specific example of how the elements of natural selection (inherited variation, the potential of a population to produce more offspring than can survive, and a finite supply of environmental resources) provide a scientific explanation for the way in which certain traits produce differences in reproductive success.
- Using an example, suggest how an environmental factor, such as drought or food shortage, could contribute to this evolutionary mechanism.